In the Claims

1. (Original) A transducer comprising:

a housing;

vibrating hardware; and

damping liquid disposed within the housing to at least partially surround the vibrating hardware.

2. (Original) The transducer of claim 1 wherein the vibrating hardware comprises:

an electrical signal carrier disposed at least substantially within the housing, with the electric signal carrier being structured to carry an electrical signal; and

a magnetic member disposed at least substantially within the housing, with the electric signal carrier and magnetic member being free to vibrate relative to each other.

3. (Original) The transducer of claim 1 wherein the vibrating hardware comprises:

a piezoelectric member made of piezoelectric material, with portions of the piezoelectric member being free to vibrate relative to each other; and

an electric signal carrier structured to be in electrical communication with the piezoelectric member.

4. (Original) A transducer comprising:

a housing;

an electrical signal carrier physically connected to the housing, with the electric signal carrier being structured to carry an electrical signal;

carrier connection hardware structured to physically connect the electrical signal carrier member to the housing;

a magnetic member physically connected to the housing;

member connection hardware structured to physically connect the magnetic member to the housing, with the carrier connection hardware and the member connection hardware being structured and located to allow the electrical signal carrier and the magnetic member to vibrate relative to each other; and

damping liquid disposed within the housing to substantially surround at least one of the electrical signal carrier and the magnetic member.

5. (Original) The transducer of claim 4 wherein the housing is structured to be sufficiently liquid tight so that no substantial amount of damping liquid can escape from the housing.

6. (Original) The transducer of claim 4 wherein at least a portion of the electric signal carrier is shaped as a coil, with the coil defining a coil interior and a coil axis.

7. (Original) The transducer of claim 6 wherein:

the carrier connection hardware is structured to substantially fix the location of the coil-shaped portion of the electric signal carrier member with respect to the housing; and

the member connection hardware structured to maintain the magnetic member at least partially within the coil interior such that the magnetic member is free to vibrate substantially in the direction of the coil axis.

8. (Original) The transducer of claim 4 wherein the magnetic member comprises a permanent magnet.

9. (Original) The transducer of claim 4 wherein the magnetic member comprises a magnetic core with a relative magnetic permeability greater than 1.0.

10. (Original) The transducer of claim 4 wherein the member connection hardware comprises a spring assembly structured and located to allow the magnetic member to vibrate in a linear direction relative to the housing along a linear vibration axis and also to allow the magnetic member to vibrate in a rotational direction relative to the housing about a rotational vibration axis.

11. (Original) The transducer of claim 10 wherein the spring assembly is structured and located so that the linear vibration axis is at least substantially the same as the rotational vibration axis.

12. (Original) The transducer of claim 10 wherein the spring assembly comprises a spring-like diaphragm.

13. (Original) The transducer of claim 4 wherein the damping liquid is shock absorber liquid.

14. (Original) The transducer of claim 4 wherein the damping liquid has a viscosity at 20 degrees Celsius between 0.5 and 1.0 centipoise.

15. (Original) The transducer of claim 4 wherein the damping liquid has a viscosity at 20 degrees Celsius between 1.0 and 100 centipoise.

16. (Original) The transducer of claim 4 wherein the electric signal carrier member, the magnetic member, the connection hardware and the damping liquid are structured and located so that external vibrations in at least the frequency range of 20 to 20,000 Hertz will induce the electric signal carrier member and the magnetic member to vibrate relative to each other.

17. (Original) The transducer of claim 4 further comprising a musical instrument, wherein the electric signal carrier, the magnetic member, the carrier connection hardware, the member connection hardware and the damping liquid are structured and located so that acoustic vibrations of the musical instrument are sufficiently energetic to cause the magnetic member and the electric signal carrier to vibrate relative to each other.

18. (Original) The transducer hardware of claim 4 further comprising an amplifier for electrically amplifying the electric signal of the electric signal carrier.

19. (Original) The transducer of claim 18 further comprising a speaker for transducing the amplified electric signal into acoustic vibration.

20. (Original) The transducer of claim 4 further comprising an electric signal supply structured and located to supply an electric signal to the electric signal carrier, with the magnitude and time distribution of the supplied electric signal being sufficient to drive the electric signal carrier and the magnetic member to vibrate relative to each other.

21. (Original) A method of designing a musical instrument assembly, the method comprising the steps of:

providing a musical instrument structured to output acoustic vibrations;

providing a plurality of transducers, with each transducer respectively comprising mutually vibrating components and damping liquid surrounding at least some of the vibrating components and with at the plurality of transducers having different damping liquids;

using each transducer of the plurality of transducers to transduce the acoustic vibration of the musical instrument into a plurality of respective electrical signals;

reviewing the plurality of electric signals; and

selecting an optimal transducer based on the review of the plurality of electric signals.

22. (Original) The method of claim 21 further comprising the step of mounting the optimal transducer to the musical instrument.

23. (Original) The method of claim 21 wherein the damping liquids have differing viscosities.

24. (Original) The method of claim 21 wherein the review of the electric signals comprises the steps of:

transducing the plurality of electrical signals back into output acoustic vibration; and

listening to the output acoustic vibration.

25. (Original) A transducer comprising:

a housing;

an electrical signal carrier physically connected to the housing, with the electric signal carrier being structured to carry an electrical signal;

carrier connection hardware structured to physically connect the electrical signal carrier member to the housing;

a magnetic member physically connected to the housing;

member connection hardware structured to physically connect the magnetic member to the housing, with the carrier connection hardware and the member connection hardware being

structured and located to allow the electrical signal carrier and the magnetic member to rotationally vibrate relative to each other at least about a rotational axis.

26. (Original) The transducer of claim 25 wherein the carrier connection hardware and the member connection hardware are structured and located to allow the electrical signal carrier and the magnetic member to rotationally linearly vibrate relative to each other at least along a linear axis.

27. (Original) The transducer of claim 26 wherein the carrier connection hardware and the member connection hardware are structured and located so that:

the only substantial rotational vibration between the electric signal carrier and the magnetic member is the rotational vibration about the rotational axis; and

the only substantial linear vibration between the electric signal carrier and the magnetic member is the linear vibration along the linear axis.

28. (Original) The transducer of claim 27 wherein the rotational axis is substantially the same as the linear axis.

29. (Original) The transducer of claim 25 further comprising damping liquid disposed within the housing to substantially surround at least one of the electric signal carrier and the magnetic member.

30. (Original) The transducer of claim 25 wherein at least a portion of the electric signal carrier is shaped as a coil, with the coil defining a coil interior and a coil axis.

31. (Original) The transducer of claim 30 wherein the carrier connection hardware and the member connection hardware are structured and located so that the rotation axis is substantially the same as the coil axis.

32. (Original) The transducer of claim 31 wherein the carrier connection hardware and the member connection hardware are structured and located to allow relative linear vibration of the electric signal carrier and the magnetic member along the coil axis.

33. (Original) The transducer of claim 25 wherein the spring assembly comprises a spring-like diaphragm with at least one aperture defined therein, with the spring-like diaphragm and aperture being shaped to cause rotational motion within the spring-like diaphragm when the spring-like diaphragm vibrates.

34. (Original) The transducer of claim 33 wherein the spring-like diaphragm is made from a material having an elasticity that is equal to or greater than that of Mylar.

35. (Original) The transducer of claim 33 wherein the diaphragm is made from a material having a relative magnetic permeability of less than 3.

36. (Original) The transducer of claim 33, wherein the diaphragm exhibits microphone characteristics.

37. (Original) The transducer of claim 33, wherein the diaphragm is made from Mylar.

38. (Original) The transducer of claim 33 wherein:

the spring-like diaphragm is substantially disk shaped; and

the spring aperture defines a plurality of curved, elongated apertures.

39. (Original) The transducer of claim 25 further comprising an amplifier for electrically amplifying the electric signal of the electric signal carrier.

40. (Original) The transducer of claim 39further comprising a speaker for transducing the amplified electric signal into acoustic vibration.

41. (Original) The transducer of claim 25 further comprising an electric signal supply structured and located to supply an electric signal to the electric signal carrier, with the magnitude and time distribution of the supplied electric signal being sufficient to drive the electric signal carrier and the magnetic member to vibrate relative to each other.

42. (Original) A method of designing a musical instrument assembly, the method comprising the steps of:

providing a musical instrument structured to output acoustic vibrations;

providing a plurality of transducers, with each transducer respectively comprising:

an electrical signal carrier structured to carry an electrical signal,

a magnetic member disposed at least substantially within the housing with the electrical signal carrier and magnetic member being structured to be free to vibrate at least rotationally with respect to each other;

using each transducer of the plurality of transducers to transduce the acoustic vibration of the musical instrument into a plurality of respective electrical signals;

reviewing the plurality of electric signals; and

selecting an optimal transducer based on the review of the plurality of electric signals.

43. (Original) The method of claim 42 further comprising the step of mounting the optimal transducer to the musical instrument.

44. (Original) The method of claim 42 wherein the review of the electric signals comprises the steps of:

transducing the plurality of electrical signals back into output acoustic vibration; and

listening to the output acoustic vibration.

45. (Withdrawn) A spring comprising:

a first end portion; and

a second end portion, with the spring being structured so that displacement of the second end portion away from the first end portion in a linear direction along a linear axis will tend to cause the second end portion to rotate with respect to the first end portion about a rotational axis.

46. (Withdrawn) The spring of claim 45wherein the linear axis is substantially the same as the rotational axis.

47. (Withdrawn) The spring of claim 45wherein the spring comprises two major surfaces, with the first end portion being a portion of the first major surface and the second end portion being a portion of the second major surface.

48. (Withdrawn) The spring of claim 47wherein the spring is substantially disk-shaped and defines at least one aperture extending from the first major surface to the second major surface.

49. (Withdrawn) The spring of claim 48wherein the spring defines a plurality of curved, elongated apertures extending from the first major surface to the second major surface.